Syllabus 2022

P-3(FBMS)

FOUNDATION COURSE EXAMINATION

JUNE 2025

FUNDAMENTALS OF BUSINESS MATHEMATICS AND STATISTICS

(Notations and Symbols used are as usual.)

Time Allowed: 1 hour

Full Marks: 100 (2×50)

SECTION I: FUNDAMENTALS OF BUSINESS MATHEMATICS (2×20=40 marks)

1. The triplicate ratio of 1 : 2 is
   (A) 2 : 3
   (B) 8 : 1
   • (C) 1 : 8
   (D) 1 : 4

2. The ratio of two numbers is 3 : 4 and their product is 1452. The smallest between the two numbers is
   (A) 22
   ∘ (B) 33
   (C) 44
   (D) 11

3. What is sum of the mean proportional between 1.4 and 35 and the third proportional to 6 and 9?
   • (A) 20.5
   (B) 18.5
   (C) 16.5
   (D) 21.5

4. If x varies jointly with y and cube root of z, when $x = 4$, $y = 2$ and $z = 27$. If $x = 8$, $y = 3$, the value of z is
   (A) 6
   (B) 27
   (C) 8
   ∘ (D) 64

5. A sum was put at simple interest at a certain rate for 3 years. Had it been put at 2% higher rate, it would have fetched ₹ 360 more. The sum is
   (A) ₹ 4,800
   ∘ (B) ₹ 6,000
   (C) ₹ 4,500
   (D) ₹ 3,600

6. A person saves ₹ 1 on the first day, ₹ 3 on the second day, ₹ 5 on the third day and so on. What is the saving (in ₹) on the 20th day?
   • (A) 39
   (B) 42
   (C) 400
   (D) 390

7. If ₹ 1,000 is deposited at the end of each year for a period of 5 years at an interest rate 10%p.a., then the Future Value Interest Factor for Annuity (Regular) is
   (A) 5.610
   (B) 6.501
   • (C) 6.105
   (D) 5.160

8. A car has travelled to a destination at a speed S with time taken T. If the distance is now doubled and speed is half of its previous speed, then the time taken by the car is
   (A) T
   (B) $2T$
   (C) $\frac{1}{2}T$
   (D) $4T$

9. Find the value of x if $\log_x 3 + \log_x 9 + \log_x 729 = 9$.
   (A) 2
   ∘ (B) 3
   (C) 4
   (D) 6

10. The number of terms to be taken so that $1 + 2 + 4 + 8 + \dots$ will be 8191, is
    • (A) 13
    (B) 12
    (C) 11
    (D) 10

37495

Please Turn Over

Handwritten at top: $x(x+1)-2(x+1)$ $2x-1$

$(x-2)(x+1)$ $x=2, -1$ $x^2 - x - 2$ $x^2 + x - 2x - 2$

11. The difference between the roots of the equation $x^2 - 7x - 9 = 0$ is

Handwritten: $\alpha - \beta$ 3×3

(A) 7

(B) 9

(C) $\sqrt{85}$ *Handwritten:* $\dfrac{7+\sqrt{85}}{2} - \left(\dfrac{7 - \sqrt{85}}{2}\right)$

(D) $2\sqrt{85}$

Handwritten: $\dfrac{7}{2} - \dfrac{7}{2} + \dfrac{\sqrt{85}}{2} + \sqrt{5}$

12. If $2^x = 4^y = 8^z$ and $\dfrac{1}{2x} + \dfrac{1}{4y} + \dfrac{1}{4z} = 4$, then the value of x is

(A) $\dfrac{7}{19}$

(B) $\dfrac{7}{23}$

(C) $\dfrac{7}{17}$

(D) $\dfrac{7}{16}$

Handwritten: $x = 2y = 3z$ $2^x = 2 \times 2^{2y}$ $x = 2y+1$ $y = \dfrac{x}{2}$

$8^{z} \; 2^{3z} = 2^{x} 2\left(\dfrac{x}{2}\right) = 3z$ $x = 3z$ $x = 3z$

13. Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ be the universal set, $P = \{1, 2, 5\}$ and $Q = \{6, 7\}$ be the two subsets. The set $(P \cap Q')$ is

(A) P

(B) Q

(C) P'

(D) Q'

14. In how many ways can final eleven players be selected from 15 players if one of them, who is in bad form, must always be excluded?

(A) 463

(B) 346

(C) 364

(D) 436

15. Find the value of $(a + 1)$, when $(a - 2)! \times 120 = (a + 1)!$.

(A) 6

(B) 5

(C) 4

(D) 10

Handwritten: $(a+1) a (a-1) = 120$ $(a^2 - 1)a = 120$ $a^3 - a = 120$

$200 + 40x - 3x^2$

16. If $f(x) = \dfrac{1}{3}x^3 - \dfrac{1}{2}x^2 - 2x$, then find the points where $f(x)$ has maximum and minimum values.

(A) maximum, $x = 1$, minimum, $x = -2$

(B) maximum, $x = -1$, minimum, $x = -2$

(C) maximum, $x = 1$, minimum, $x = 2$

(D) maximum, $x = -1$, minimum, $x = 2$

17. The price of a commodity is ₹55 per unit and the cost function is $C(x) = 30x + 250$. Find the break-even point.

(A) 12

(B) 10   *Handwritten:* $30x + 250 = 55x$

(C) 15

(D) 18

18. Determine the value of k for which the function

$$f(x) = \dfrac{x^2 - 9}{x - 3}, \text{ for } x \neq 3$$
$$= k, \text{ for } x = 3$$

is continuous at $x = 3$.

(A) 18

(B) 12   *Handwritten:* $\dfrac{(x+3)(x-3)}{(x-3)}$

(C) 9

(D) 6

19. If $y = e^x x^2$, then $\dfrac{d^2 y}{dx^2}$ is

Handwritten: $x^2 \cdot e^x + e^x \cdot 2x$ $e^x(x^2 + 2x)$

(A) $e^x(x^2 + 4x + 2)$

(B) $e^{2x}(x^2 + 4x + 2)$

(C) $e^x(x^2 + 4x)$ *Handwritten:* $(x^2 + 2x)e^x + e^x(2x$

(D) $e^x(x^2 + 2x + 2)$ *Handwritten:* $e^x(x^2 + 4x + 2)$

20. The demand function of a certain product is $p = 200 + 20x - x^2$, where x is the number of units demanded and p is the price per unit. Find the marginal revenue when $x = 10$ units are sold.

(A) 320   *Handwritten:* $20 - 2x = 10x$

(B) 420

(C) 300   *Handwritten:* $200 + 40x - 3x^2 = 10x$

(D) 460

Handwritten at bottom: $3x^2 - 30x - 200 = 0$ -600

SECTION II: FUNDAMENTALS OF BUSINESS STATISTICS (2×30=60 marks)

21. Mr. X collected some field data for his research. Subsequently Ms. Y used the same data for her research. Then which of the following statements is true?

   (A) Both Mr. X and Ms. Y used primary data.

   (B) Both Mr. X and Ms. Y used secondary data.

   (C) Mr. X used primary data but Ms. Y used secondary data.

   (D) Mr. X used secondary data but Ms. Y used primary data.

22. Which diagram is suitable for representing the cumulative frequency distribution of heights of soldiers?

   (A) Ogive

   (B) Histogram

   (C) Line diagram

   (D) Scatter diagram

23. Fill in the gap: In world export, a country contributes 40 per cent of the total world export. In pie diagram, it represents _____ degree.

   (A) 180

   (B) 144

   (C) 120

   (D) 136

24. The frequency density of a class of a grouped frequency distribution is defined as

   (A) Class frequency / Total frequency

   (B) Class frequency / Class-mark

   (C) Total frequency / Class frequency

   (D) Class frequency / Width of the class

25. If the arithmetic mean of n natural numbers with respective weights 1, 2, 3, ..., n be 15, then the value of n is

   (A) 24

   (B) 23

   (C) 22

   (D) 18

26. If the median of the observations 7, 11, $2x - 1$, $2x + 1$, 23 and 29 written in ascending order is 18, the value of x is

   (A) 9

   (B) 6

   (C) 12

   (D) 13

27. What is the arithmetic mean of the median and the mode of the data given below?

8, 10, 3, 6, 4, 8, 9, 3, 15, 2, 6, 4, 19, 11, 8

   (A) 6

   (B) 5

   (C) 4.5

   (D) 5.5

28. Find the standard deviation from the following data:

$N = 10$, $\Sigma fx = 60$, $\Sigma fx^2 = 1000$

(A) 64

(B) $\sqrt{96}$ 36 $\dfrac{1000-}{100}$

• (C) 8

(D) 4

29. Find the coefficient of variation, if the sum of the squares of deviations from mean 50 of 10 observations is 250.

(A) 50% $10(x - \bar{x}) = \dfrac{250}{10}$

• (B) 10%

(C) 12% $\sqrt{5}$

(D) 8%

$\dfrac{5}{50} \times 10$

30. Find the quartile deviation of daily wages (in ₹) of seven persons given:

312, 207, 215, 210, 319, 412, 328

(A) 62 $207, 210, 215, 312, 319, 328$

(B) 63

• (C) 59 ✓

(D) 72

31. For a frequency distribution, $(Q_1 + Q_3) = 100$ and the median is 38. If the Bowley's coefficient of skewness is 0.6, what are the values of Q_1 and Q_3?

• (A) $Q_1 = 30$, $Q_3 = 70$

(B) $Q_1 = 20$, $Q_3 = 80$

(C) $Q_1 = 40$, $Q_3 = 60$

(D) $Q_1 = 10$, $Q_3 = 90$

32. The harmonic mean of 1, 2 and 4 is

(A) 7/3

(B) 3/7 $\dfrac{3}{1 + \frac{1}{2} + \frac{1}{4}}$

(C) 7/12

• (D) 12/7

$\dfrac{4+2+1}{4}$ $\dfrac{3 \times 4}{7}$

33. Find the Spearman's rank correlation coefficient from the given data:

$\Sigma d_i^2 = 70$, $n = 6$.

○ (A) −1

(B) 1

(C) 0.32

(D) −0.68

34. If the regression lines are $4x - 5y + 33 = 0$ and $20x - 9y = 107$, the correlation coefficient is

(A) −0.6

• (B) +0.6 $\dfrac{7 \cdot 4}{7 \cdot 5}$

(C) ±0.6

(D) 0.8

$\dfrac{3}{20} \times \dfrac{4}{5}$

$\dfrac{14}{75} \times \dfrac{9}{20}$

35. If the correlation coefficient of two variables x and y is r_{xy}, then the correlation coefficient of $u = \dfrac{x-a}{b}, (b \neq 0)$ and $v = \dfrac{y-c}{d}, (d \neq 0)$ is

(A) bdr_{xy} bd

(B) $\left(\dfrac{b}{d}\right) r_{xy}$

(C) $\left(\dfrac{a}{b} + \dfrac{c}{d}\right) r_{xy}$

(D) r_{xy}

$\sqrt{\dfrac{1}{b} \times \dfrac{1}{d}}$

$\dfrac{x-a}{b} \left(\dfrac{y-c}{d}\right)$

36. If the correlation coefficient $r_{xy} = +1$, then the regression line y on x is

   (A) parallel to the x-axis.

   (B) parallel to the y-axis.

   (C) up-ward straight line.

   (D) down-ward straight line.

37. "Rain has affected very badly the wheat crop" is an example of

   (A) secular trend

   (B) cyclical movement

   (C) seasonal movement

   (D) irregular movement

38. Calculate the simple average of price relative index for the current year from the given data:

Item	Price per unit (in ₹) of current year	Price per unit (in ₹) of base year
I	30	25
II	25	30

   (A) 203.33

   (B) 101.7

   (C) 100

   (D) 50.8

(handwritten: 1.2, 0.83, 2×3 / 2×3)

39. If the current year prices and base year prices for all items are same but the quantities of items for current year are double of the quantities of the items for the base year, then Laspeyres' price index number is

   (A) 50

   (B) 150

   (C) 100

   (D) 200

40. If $P(A \cap B) = 0$ and $P(A \cup B) = 1$, then events A and B are

   (A) mutually exclusive but not exhaustive.

   (B) neither mutually exclusive nor exhaustive.

   (C) not mutually exclusive but exhaustive.

   (D) mutually exclusive and exhaustive.

41. If $P(A) = \frac{3}{8}, P(B) = \frac{1}{2}$ and $P(A \cup B) = \frac{3}{4}$, then $P(A|B)$ is

(handwritten: $\frac{3}{8} + \frac{4}{8} - \frac{6}{8}$)

   (A) $\frac{2}{3}$

   (B) $\frac{1}{3}$

   (C) $\frac{1}{4}$

   (D) $\frac{3}{5}$

(handwritten: $\frac{1}{8} \times \frac{2}{1}$)

(handwritten: $ub = x - a$, $x = el(b) + a$)

42. The probability that a leap year selected at random will have 53 Fridays is

   (A) $\frac{1}{7}$

   (B) $\frac{2}{7}$

   (C) $\frac{2}{3}$

   (D) $\frac{1}{3}$

(handwritten: $NC = y$, $\sqrt{bd} = \sqrt{xy}$, $\sqrt{xy}$)

43. Calculate the 3-year weighted moving average for the year 2018 from the following data. Apply the weights 0.3, 0.4 and 0.3.

Year: 2016 2017 2018 2019 2020

Production units: 20 22 24 23 25 (in thousand)

$0.3 \quad 0.4 \quad 0.3$

(A) 23

(B) 24

• (C) 23.1

(D) 23.9

44. If Fisher's and Laspeyres' price index numbers are respectively 129 and 132.5, the Paasche's price index number is

(A) 126.4

(B) 124.7

(C) 122.8

• (D) 125.6

45. The expression for the event "neither A nor B occurs" is

(A) $(A' \cup B')$

• (B) $(A \cup B)'$

(C) $(A' \cap B)$

(D) $(A \cap B')$

$A' \cap B'$

$(A \cup B)' (A \cap B)'$

46. An urn contains 2 red and 1 green balls and another urn contains 2 red and 2 green balls. An urn is selected at random and a ball is drawn randomly from it. If the ball is found to be red, then what is the probability that the ball is selected from the first urn?

• (A) $\frac{4}{7}$

(B) $\frac{3}{7}$

(C) $\frac{2}{3}$

(D) $\frac{7}{12}$

47. Calculate the correlation coefficient from the following data:

$n = 7, \Sigma xy = 25, \Sigma x^2 = 28, \Sigma y^2 = 34$

where $x = X - \bar{X}, y = Y - \bar{Y}$.

(A) 0.81

(B) 0.18

(C) 0.85

(D) 0.58

$\dfrac{25 - \bar{x}\bar{y}}{\sqrt{\frac{28 - (\bar{x})^2}{7}} \cdot \sqrt{\frac{34}{7} - 7}}$

48. If $\Sigma P_n Q_n = 500$, $\Sigma P_0 Q_0 = 100$, $\Sigma P_n Q_0 = 300$, $\Sigma P_0 Q_n = 200$, find the Fisher's quantity index number for the "nth" year with base year "0".

(A) 54.77

(B) 183.33

• (C) 273.86

(D) 182.57

49. The mean score of a group of 100 students is 45. Later it was found that the score 55 was misread as 75 and one score 60 was taken extra. Find the corrected mean score.

• (A) 44.65

(B) 44.20

(C) 44.40

(D) 45.05

50. If 10 occurs 17 times, 8 occurs 15 times and 6 occurs 18 times, then the median is

(A) 8

◦ (B) 10

(C) 15

(D) 18